# Towards Relating Delivery Methods and Examination Success: Lessons Learned from the VALO LLP Project Case Study

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## Abstract

Didactic, teacher-centred approaches and rote learning have long been discredited and gradually replaced by participative, interactive and creative learning sessions. Formal classroom sessions are being replaced or augmented by self-directed study increasingly in distance mode. The evolution and affordability of technologies enables massive participation in studies, not only for short training for professional updating but also for longer study periods and attainment of qualifications. The rapid changes in society and technology demand that everybody continuously updates their knowledge and skills in their area of expertise and gain knowledge, skills and competencies in other areas for a successful life of careers and not necessarily a career for life as was the norm in the past. It is important to safeguard the quality of independent assessment and certification methods. In this paper we consider the main delivery methods and their impact on assessment methods and associated results. With reference to the ECQA framework and the recently completed EU co-funded Lifelong Learning Programme project VALO we juxtapose the delivery methods used and the examination results at different partner institutions. We extract observed issues and trends, which could be principles to be adopted by future projects with regards to process improvement and performance enhancement.

**Keywords: VALO Project, Valorisation, ECQA, Teaching Methods, Assessment Methods**

## 1.0 Teaching Methods

### 1.1. Teacher-centred vs. Student-centred Teaching and Learning

The principal mode of traditional education in higher education was to be found in the classroom, where the teacher delivered the lecture and students listened and wrote notes. This arrangement is referred to as the *sage on the stage* [1]. The interaction between professor and student has been viewed as an essential learning element within this arrangement [2]. In turn, learners often engaged in rote learning which is often crudely defined as learning so as to be able to remember verbatim. It is a falsehood to define Rote Learning as mere memorising and rehearsing but is by definition part of the surface approach to learning because there is no intention to seek meaning and understanding [3]. It could be understood in terms of the intention to reproduce, to recall knowledge and procedures; but, despite the intention of gaining relational understanding of theory and concepts, learners fail to gain deep understanding of the principles and concepts thus any success is likely to be incidental rather than intentional.

Over the last 30 years there has been a marked shift from a teacher-centred paradigm of instruction to a learner-centred paradigm, fuelled by the need to meet the increasingly diverse needs of students and to make the required increases in achievement gains. The use of interactive and participative methods coupled with the development of Information and Communication Technologies (ICT) and the social media revolution has brought additional opportunities and challenges to the whole interaction, communication and collaboration. A certain degree of reluctance to use social media by some academics has been observed which indicates that greater awareness about the potential benefits of these technologies as well as systematic staff development are required.

The major benefit from the student-centered teaching method is the development of students' skills, knowledge, and abilities enabling them to feel secure and be successful in their chosen area of work. In particular, the student-centered teaching method facilitates participation in discussions, which shares and develops good practice and enhances a large range of transferable skills. These in turn contribute to academic well-being and employability. One of the most significant benefits of this approach is that students can develop skills in facilitation, listening, expressing ideas, developing ideas through collegiality, and working together [4] [5].

### 1.2 Task Based Learning

Task-based learning (TBL) is a teaching methodology, which is characteristically based on three core stages [6]. The initial *pre-task stage*, concerns the teacher introducing and defining the topic and the learners engaged in activities that either help them to recall knowledge that will be useful during the performance of the main task or to ascertain knowledge that is essential to the task. The second stage, *the task cycle*, demands that learners perform the task. This is typically done in pairs or small groups. The resultant output, characteristically a report, is then communicated to the class, i.e. fellow learners and teacher. It also includes a reflective statement on how the exercise was conducted. The final stage is the *focus stage* where the specific learning outcomes from the tasks are highlighted and worked upon. This reporting stage is informed by feedback on the learners' performance.

The advantages of TBL are: 1) the focus of the learning process is shifted from the teacher to the student; 2) it offers the learner a different way of understanding the learning material, viewing it as a tool as opposed to a specific goal; 3) it brings teaching from abstract knowledge to real world applications; and 4) it assists in meeting the immediate needs of learners.

### 1.3 Distance Learning, Synchronous & Asynchronous and Blended Learning

Traditional learning set ups involve synchronous face-to-face delivery of learning sessions. Distance Learning is a formal approach to learning where a large degree of the instruction happens whilst the teacher and learner are at a distance from one another [7]. The purpose of this paper is to share, via a case study, how a blend of the two approaches has permitted effective delivery of short course for professional updating and also for longer study periods and attainment of professional qualifications. Most teaching sessions were classroom based face to face sessions coupled with small group exercises and discussions.

Synchronous learning environments require the availability of teachers and students at set times. They provide immediate communication but allow less time for reflection, while asynchronous learning provide more time for reflection, allow for flexibility and suit people

who are more introverted [8]. In reality, in most cases learning happens in a blend of face-to-face, distance mode and asynchronous and synchronous delivery. As the technologies advance younger generations of both learners and teachers become familiar and comfortable with new technologies and methods of learning and teaching. A recent manifestation is the rapid growth of the MOOCs phenomenon [9].

### 1.4 Technologies for Distance Learning

There is a plethora of technologies that can be used in order to implement Distance Learning (DL). Typically distance learning technologies can be divided into two modes of delivery: synchronous learning (e.g. web/video conferencing, internet radio, live streaming, telephone, web based VoIP, etc.) and asynchronous learning (e.g. message board forums, email, video/audio recordings, print materials, voicemail, fax, etc.) with a particular focus of the specific advances in mobile and wireless technologies [7]. One of the main basic principles of using technologies in learning and teaching is to recognise that no single technology is optimal for the delivery of every kind of message to all learners in all locations [10].

## 2.0 The VALO Project

The European Union Lifelong Learning Programme (EU LLP) was designed with a two fold intention: to enable people, at any stage of their life, to take part in stimulating learning experiences (Lifelong Learning) and in developing education and training across member states of the European Union. The VALO Project was funded by the EU LLP Leonardo da Vinci, one of six sub programmes constituting the LLP (http://eacea.ec.europa.eu/llp/).
The VALO Project aimed to create a new certified Valorisation Expert profession adding to the existing certifications in the European Certification and Qualification Association (ECQA). The ECQA is a non-for-profit association, joining institutions and several thousands of professionals from all over Europe and outside of Europe (http://www.ecqa.org). It connects experts from the market and supports the definition and development of the knowledge (skill cards) required for job roles and defines and verifies quality criteria for Training organisations and Trainers to assure the same level of trainings all over the world.

### 2.1 The VALO project: The Rationale

All projects need to valorise their results and outputs for maximising achievements and increasing sustainability after their lifetime. This includes transfer of results and best practices to different and broader contexts, potential tailoring to the needs of others, continuation after the funding period has finished, influencing policy and practice, serving the public good. The emphasis is on optimising the value of a project and on boosting its impact. Many European and other projects seem to be missing a valorisation strategy. Projects seem to be carried out in isolation and finish without lasting impact. In addition, there is a lack of skills for carrying out valorisation actions.

All projects need to disseminate, sustain and exploit their results and outputs. Dissemination means spreading information to ensure that others benefit from experience and know-how gained in the project. Dissemination includes broad dissemination (communication with public or stakeholders not strongly involved with the project) and deep dissemination (addressing the target group as early and as extensively as possible). Exploitation of the results of project activities embodies the act of employing results to the greatest possible advantage. Exploitation needs appropriate mechanisms to make results more attractive for use by the target group; tailor the results to the needs of specific target groups, sectors or

organisations; transfer results that could be used by new target groups or sectors; sustain results and keep them in use and existence; influence and change mainstream practice and policy. In summary it means that more people can share in the successes, experiences and lessons learned. The emphasis is on optimising the value of the project for diverse stakeholders (society, community, institutions, and individuals) and boosting its impact. In order to support individuals and organisations in building competences in valorisation a new innovation transfer project entitled 'ECQA Certified Valorisation Expert Training and Certification (VALO)' was developed 2011-2013 within the frame of the European-wide accepted scheme of European Certification and Qualification Association and supported by the EU Lifelong Learning Programme. The aim of the project was the transfer of valorisation skills to industry.

### 2.2 The Consortium

The VALO Project established a consortium comprising of individual partner institutions, which delivered training events. The individual partner institutions were:

1. Alexander Technological Educational Institute of Thessaloniki, Greece [ATEI] [coordinating]
2. FH Joanneum University, Austria [FHJ]
3. University of Vaasa, Finland [VY]
4. Middlesex University London, UK [MDX]
5. International Software Consulting Network LTD, Ireland [ISCN]
6. Thessaloniki Chamber of Commerce and Industry, Greece [TCCI]
7. VET Thermi, Greece [IEK]

### 2.3 Valorisation Expert Syllabus (VALO project)

Course material was developed in order to produce units of learning with outcomes containing international working skills that can be integrated in the ECQA scheme. The Valorisation Syllabus proposed and developed within the frame of the VALO project consists of 13 Elements aiming to give the learner an overall knowledge about innovation; how to recognise, exploit, disseminate and get value from it. The detailed syllabus can be found at: http://www.ecqa.org/Browse/. The syllabus consists of 4 Units (U). Each Unit comprises of several Elements (E). This is consistent with the ECQA requirements. This structure can be found in the Skill Card (Syllabus), Training Material, Multiple Chose Questions, On-line self-assessment, Exams and Certifications. The Units and Elements in the Valorisation Job-role are the following:

**1)** Introduction to Valorisation U1.E1; **2)** Innovation U1.E2; **3)** Broad and Deep Dissemination U2.E1; **4)** Dissemination Strategy U2.E2; **5)** Creating Stakeholder Value U3.E1; **6)** Sustainability U3.E2; **7)** Mainstreaming U3.E3; **8)** Exploitation Strategy U3.E4; **9)** Diffusion U4.E1; **10)** Communication to Potential Stakeholders U4.E2; **11)** Valorisation Channels: Formal and Informal Valorisation U4.E3; **12)** Valorisation Tools (Cluster Building, Open Innovation, etc.) U4.E4; and **13)** Intellectual Property Rights U4.E5.

ECQA adopts a credit accumulation scheme (similar to the European Credit Transfer and Accumulation System (ECTS)) whereby trainees choose to attend the whole or part of the course. They can choose the elements they are mostly interested in to study in-depth with the view of achieving a high score and obtaining a certificate in their chosen elements. Those trainees that achieve 66% or more in all 13 elements have the opportunity to become future Valorisation trainers.

## 3.0 The VALO Project: Target Groups, Delivery & Assessment Methods

### 3.1 Target Groups

The trainees, registered and participating, in the VALO project were from diverse, disparate backgrounds. In addition to the diversity in age, cultures and race, the trainees came from various working environments: industry (including small to medium enterprises SMEs; businesses, companies and institutions affiliated to local Chambers of Commerce and Industry; and global international companies), universities, research institutions, and unemployed graduates. This is in line with the philosophy espoused by the EU LLP. The emphasis of the pilot trainings was to ensure that trainees gained expertise, knowledge, skills and competencies in Valorisation.

Evaluation questionnaires were used in order to obtain feedback on the training delivered by partner institutions. This feedback and reflection from trainees, as well as from trainers yielded suggestions for further improvements to the materials and Multiple Choice Questions (MCQ) database. Knowhow from these pilot trainings will also be useful for future provision of ECQA Valorisation Expert Training and Certification training and examination, as part of the sustainability of the project.

### 3.2 Delivery and Assessment Methods

As part of the VALO Training and ECQA Certification, partner institutions made use of a blend, of synchronous and asynchronous learning methods and associated technologies in order to have effective and efficient learning and teaching to support the trainee and teacher experience.

The assessment methods were both formative and summative. Students received the formative part of the assessment primarily through the face-to-face practice sessions with formative assessments, self-tests, provided by the ECQA portal. Some partners delivered individual online tutorials via Voice-over-IP (VoIP) service, instant messaging and video [Skype]. In addition feedback was provided during the workshops, and exercises and tasks; feedback was provided on request by trainers via Skype sessions as well as emails. Summative assessment involved 3 methods namely the on-line ECQA examination, a portfolio assessment according to the ECQA rules, or a customised set of questions as in the case of the FHJ pilot training.

To further support Distance Learning audio was incorporated into the learning materials that were used in formal classes, thus permitting the trainees to listen to lectures at a distance and at a convenient time for them. ISCN facilitated synchronous online meetings via web conferencing tool, GotoMeeting, to permit: screen sharing, VoIP and video conferencing to support Task Based Learning. ISCN trainees were tasked with the assignment to elaborate a VALO sustainability strategy. They uploaded evidences of work and participated in online sessions to present their work (similar to the approach of the national Extension Centers in the UK as part of the DTI strategy). In such a training scenario with industry the elaborated results from work place were used as evidences to carry out skills assessment. Evidences are uploaded and evaluated by ISCN assessors. If the assessment is positive for a certain learning area, the certificate will show the completion of that learning element.

Evaluation questionnaires were used in order to obtain feedback on the training delivered by each partner institution. This feedback and reflection from trainees, yielded suggestions for further improvements to future training and examination provision of the job-role for ‘ECQA Valorisation Expert Training and Certification’, as part of the sustainability of the project.

As part of this EU LLP VALO project, a number of partner institutions of the consortium, assessed trainees by conducting online MCQ examinations. It was fundamental that in order to gain professional certification, this demanded that there was a mastery of foundational knowledge.

## 4.0 Performance and Evaluation

The sources of data for the required statistical analysis were the individual Training and Examination Reports available from each of the partner institutions. In addition, the raw data contained in Excel Spreadsheets, presenting the examination and portfolio assessment results, per Element, per participant, were available. Finally, data concerning the feedback elicited from Trainees via the completed questionnaires was accessible via respective VALO Training Evaluation Spreadsheets. This statistical analysis may highlight issues concerning the efficacy of the online assessment process, which may pave the way to possible improvements.

### 4.1 Analysis of results of online multiple choice exams performed by Trainees, across the partner institutions

With regards to the online multiple choice exams completed by Trainees via the ECQA Skill & Exam Portal, there were a maximum of 13 elements that could be assessed per Examination. Not all of the partner institutions tested all 13 elements in each of their respective examinations. Partner institutions got their trainee cohorts to complete online examinations.

At the 4th VALO Project and Quality Assurance meeting which was attended by representatives from the partner institutions in the consortium the training report formed part of the agenda. A Training and Examination Report was presented, which highlighted the statistical analysis of the VALO Examinations that had taken place prior to this meeting across the partner institutions. The average scores of Trainees, per Element, across four of the seven partner institutions prior to the 4$^{th}$VALO Project and Quality Assurance meeting, at this juncture only four of the seven partner institutions had completed assessments by that stage, hence the partial data set, were recorded.

There were three particular Elements that had relatively poor scores: U3.E1 [Creating Stakeholder Value], U3.E4 [Exploitation Strategy] and U4.E5 [Intellectual Property Rights]. When the training sessions started (in the ATEI, for example) the MCQs for U3.E1 were not accessible due to an erroneous connection to the U3.E2 element instead. This may go some way towards explaining the poor results in that element. This coupled with the generic issues raised by the Evaluation of the Examination by Trainees across partner institutions, flagged quality issues with regards to the MCQs. As a result of this analysis and evaluation the database of MCQs at the ECQA Skill & Exam portal was refined in order to address issues, which are listed in Section 4.5. Thus, the examinations that were administered post 4$^{th}$ VALO Project and Quality Assurance meeting, made use of these new/refined/improved MCQs. Although the size of the cohorts in each instance is rather small we can draw some indicators and trends by analysing the exam results and the Evaluation Feedback, which are presented in Section 4.2. The pass limit is set at 66% by the ECQA. There were three Elements namely U1.E2, U4.E1 and U4.E2, that achieved, or bettered, this threshold.

### 4.2 Statistical analysis of examination participation and results

There were a total of 280 applicants for VALO training across the seven partner institutions of which 204 people were trained. Of the total number trained 147 engaged with the assessment regime.

Table 1, presents the average scores of Trainees, per Element across partner institutions, post 4th VALO Project and Quality Assurance meeting. Note from Table 1, that the partner FH JOANNEUM did not teach and assess all of the 13 elements that constitute the full VALO Programme. FHJ decided to offer a workshop about Valorisation which suited best the needs of their workshop participants. FHJ distributed the Skill card to potential attendees of the workshop to ascertain not only their level of interest but also the elements which were of interest to them.

A pre and post 4thVALO Project and Quality Assurance meeting comparison of the three best, and the three worst, Elements are presented in Table 2. The results presented in Table 2 suggest that in all cases there was an improvement in the average score attained by trainees. This can possibly provide further evidence that the action taken, as a result of the analysis, evaluation of the examination process at the 4thVALO Project and Quality Assurance meeting, to make use of new and/or amended MCQs in the ECQA portal was beneficial with regards to the improvements of the VALO assessment procedure. Note that the Post statistics presented in Table 2, does not include the average scores of Trainees, per Element, across the ISCN partner institution because they did not make use of the MCQs as part of their assessment regime.

### 4.3 Passing all thirteen Elements

Entitlement to the job role of a Valorisation Expert requires passing of all thirteen elements. All trainees who chose to attempt the exams passed 1 or more elements especially those that had opted to specialise in those elements. Further examination attempts were offered to all trainees, several of which took up the opportunity to achieve additional credits. Some trainees were not interested in taking the examination at all reporting that they gained much awareness and knowledge but were not interested in a formal certification. For the same reason several trainees did not take up any resit opportunities after their first or second attempt. Table 3 shows the percentage of trainees that passed all 13 Elements, per partner institution, thus achieving the entitlement to the job role of a Valorisation Expert. These Experts have the opportunity to evolve into Trainers in future.

The relative success of some partner institutions in getting their trainees achieving full accreditation by passing all 13 elements justify the third and in some cases a fourth, attempt at the examination being offered to Trainees. It is also a substantiation of the efficacy of using Task Based Learning and evidence based assessment of skills as utilised by ISCN.

### 4.4 Linear Relationships between variables in the data set

There was an attempt to measure the strength and direction of possible relationships existing between variables in the data set captured by the evaluation questionnaire. We tried to establish whether to see if there were any relationships between the following sets of two variables:

- Average Exam results [calculated from data presented in Table 1] and Age of Trainee
- Average Exam results and general satisfaction with the subject [Likert Scale: Not at All satisfied = 0, Fully satisfied with the subject = 5]

- Average Exam results and Experience with the selected field before the workshop [Likert Scale: I have No experience, I'm not familiar with the field = 1, I am a process Analyst, Quality Manager, etc. = 5]

Table 4 presents the averages for Age of Trainee, general satisfaction with the subject and the degree of a trainee's experience with the selected field before the workshop across four of the institutions in the consortium. The correlation coefficients for the sets of two variables listed above were calculated and the results also presented in Table 4.
It must be noted that the amount of data that was available for the statistical analysis was very small. A value of zero or approaching zero, for *r* implies no linear correlation. Therefore, no correlation between Average Exam Result and Average Trainee Experience OR Average Trainee Degree of Satisfaction exists. Correlation coefficients whose magnitudes are between 0.5 and 0.7 indicate variables which can be considered moderately correlated. Therefore, moderate correlation exists between Average Exam Result and Average Trainee Age.

**4.5 Evaluation of the Examination Process by Trainees**
An evaluation of the examination process by trainees across the partner institutions was presented at the 4th VALO Project and Quality Assurance meeting. The concerns with regards to the MCQs used for assessment were:

- Some of the questions were ambiguous especially when either all the options provided were correct or all incorrect.
- Several spelling and grammatical errors present in the wording of questions.
- MCQs offering a "*none of the above*" choice.
- Plain English being used in order to aid understanding for those whom English was not the first language.
- A number of the Trainees did comment that the pass limit of 66% was very high.
- Some trainees suggested that some MCQs tested superficial learning. Alternative methods of assessment e.g. essay style questions would be preferable in order that students could fully articulate their thoughts on the issues invoked per Learning Element.

A number of these Quality issues were addressed in order to improve the content of MCQs. As a result the average scores of Trainees, per Element, across partner institutions for the worst and best performing Elements improved.

The issue of MCQs testing superficial learning, as identified above, is an interesting one. It could be argued that poorly constructed MCQs are an example of low level of abstraction of questions, testing low level cognitive skills, for example, recall and comprehension. By using teaching strategies, such as the task based learning adopted by ISCN, higher cognitive skills, such as analysis and synthesis can be more frequently tested for. This could possibly lead to better equipped Valorisation Experts being produced by VALO Projects. Also discussed was the translation of materials and assessments into native languages, where applicable. The utmost care must be taken that syntactical and semantic errors do not creep into the translation process and must be avoided at all costs.

## 5.0 Conclusion

This paper reports on the efforts of partner institutions in Austria, Finland, Greece, Ireland and the UK as part of the ECQA Certified Valorisation Expert Training and Certification (VALO) project, with the express aim and objectives of the project to create a new certified Valorisation Expert profession adding to the existing certifications in the ECQA.
The 4$^{th}$VALO Project and Quality Assurance meeting flagged some quality issues concerning the Examination process. Improvements were made to the MCQs in time for the planned resit examinations. The statistical analysis suggests that the improved revisions made to the pool of MCQs used to assess trainees lead to marked improvements in pass rates.
An interesting issue raised is that of using alternative ways to measure assessment performance other than online MCQs. Our ISCN partner has gone down the path of using Task Based Learning, which seems to be an effective alternative to the teaching and learning of the VALO material used at other partner institutions. The percentage of registered Trainees achieving full accreditation, 70.6%, at ISCN, is an indication of this approach to teaching and assessing.

Table 3 shows that no registered trainee at FHJ, VY and IEK passed all 13 elements of the VALO syllabus thus achieving the entitlement to the job role of a Valorisation Expert. It should be noted that attendees of workshops are not compelled to undertake the learning of the entire syllabus and are free to choose the elements which are of interest to them, which would equip them with just the skills sets they require. There is a temptation to seek correlation between delivery methods utilising the use of synchronous and asynchronous technologies and the results of scores obtained per partner institution. It would be easy to select choice statistics, e.g. ISCN's sole use of synchronous online meetings, via a web conferencing tool and the 70.6% of trainees passing all 13 elements; or FHJ's sole use of pure face-to-face delivery not further supplemented by any use of Distance Learning technologies and their choice not to seek to produce any Valorisation Experts. This would be imprudent because the reason spelt out above with regards to non compulsion to undertake learning of the whole syllabus. The ISCN results may well be explained by the typical profile of the registered trainee. The ISCN cohort comprised of coordinators of the EuroSPI initiative and key members and board of the ECQA. These trainees have relatively better education and considerable experience in related areas and also in the use of the ECQA platform that they could call upon when assessed, in comparison to trainees from other target groups. In addition, the tasks completed by ISCN trainees, as part of Work Based Learning (WBL) tasks, directly related to their workplaces, i.e. developing a valorisation strategy for their respective organisations. This may well give them further advantage to achieving better scores.

Care should be taken when using the statistical analysis of the exam results and Evaluation Feedback on the examination, as a basis for reasoning or for changes made to future VALO training events and examination. There is relatively a very small statistical population and it would be imprudent to blindly make decisions solely on the basis of the statistical analysis presented.

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Table 1: Average scores of Trainees, per Element, across partner institutions

| | **ELEMENTS** | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **PARTNERS** | U1.E1 | U1.E2 | U2.E1 | U2.E2 | U3.E1 | U3.E2 | U3.E3 | U3. E4 | U4. E1 | U4. E2 | U4. E3 | U4. E4 | U4. E5 |
| **P0-ATEI** | 77.94 | 82.01 | 69.51 | 74.97 | 67.23 | 76.09 | 75.34 | 69.16 | 81.05 | 78.68 | 81.62 | 76.91 | 69.11 |
| **P1-FHJ** | 73.02 | 67.61 | 50.73 | 44.88 | | 19.32 | | 37.14 | | | 64.49 | | 41.86 |
| **P2-VY** | 61.30 | 67.50 | 47.50 | 59.80 | 0.00 | 57.90 | 56.40 | 41.70 | 64.00 | 59.00 | 59.60 | 49.30 | 40.60 |
| **P3-MDX** | 59.61 | 72.58 | 58.84 | 64.07 | 58 | 62.36 | 57.6 | 50.49 | 64.16 | 65.63 | 61.9 | 59.62 | 53.01 |
| **P4-ISCN** | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| **P5-TCCI** | 72.15 | 80.78 | 68.17 | 69.1 | 71.5 | 73 | 71.1 | 65.89 | 73.84 | 69.9 | 80.62 | 74.01 | 67.47 |
| **P6-IEK** | 48.00 | 64.40 | 49.30 | 52.30 | 0.00 | 51.70 | 55.80 | 56.10 | 78.30 | 65.60 | 52.00 | 67.80 | 47.00 |
| | | | | | | | | | | | | | |
| **AVERAGE** | **70.29** | **76.41** | **63.44** | **66.45** | **74.17** | **62.91** | **69.37** | **60.07** | **76.89** | **73.14** | **71.46** | **71.27** | **59.86** |

Table 2: A pre and post 4$^{th}$VALO Project and Quality Assurance meeting comparison of the three best, and three worst, Elements

| **Element** | **Pre** | **Post** | **Difference [%]** |
|---|---|---|---|
| U1.E2 | 70.6 | 76.41 | 5.81% |
| U4.E1 | 71.9 | 76.89 | 4.99% |
| U4.E2 | 66.9 | 73.14 | 6.24% |
| U3.E1 | 46.3 | 74.17 | 27.87% |
| U3.E4 | 50.6 | 60.07 | 9.47% |
| U4.E5 | 48.8 | 59.86 | 11.06% |

Table 3: the percentage of trainees that passed all 13 Elements, per partner institution

| **Institution** | **People trained** | **Pass > 66% in all elements** | **Percentage** |
|---|---|---|---|
| ATEI | 31 | 8 | 25.8% |
| FHJ | 26 | 0 | 0.0% |
| VY | 10 | 0 | 0.0% |
| MDX | 28 | 6 | 21.4% |
| ISCN | 17 | 12 | 70.6% |
| TCCI | 55 | 20 | 36.4% |
| IEK | 37 | 0 | 0.0% |
| **TOTAL** | **204** | **46** | **22.5%** |

Table 4: Correlation Coefficients calculated for the sets of two variables

| **Institution** | **Average Exam Result %** | **Average Trainee Age [Years]** | **Average Trainee Experience** | **Average Trainee Degree of Satisfaction** |
|---|---|---|---|---|
| **ATEI** | 70.91 | 33 | 2.5 | 3.5 |
| **VY** | 54.61 | 30 | 2.8 | 3.6 |
| **MDX** | 56.74 | 26 | 2.1 | 3.2 |
| **IEK** | 61.00 | 25 | 1.8 | 3.1 |
| **Correlation Coefficient [*r*] =** | | **0.57** | **-0.04** | **0.1** |